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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,589	08/16/2006	Toshihide Sekido	HIP-06-1238	2699

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IP GROUP OF DLA PIPER LLP (US)  
ONE LIBERTY PLACE  
1650 MARKET ST, SUITE 4900  
PHILADELPHIA, PA 19103

EXAMINER
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DYE, ROBERT C

ART UNIT	PAPER NUMBER
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1791

NOTIFICATION DATE	DELIVERY MODE
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08/02/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pto.phil@dlapiper.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/589,589	<b>Applicant(s)</b> SEKIDO ET AL.	
	<b>Examiner</b> ROBERT DYE	<b>Art Unit</b> 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,5,7,10,13-23,50,54,56,59 and 62-69 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5,7,10,13-23,50,54,56,59 and 62-69 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/29/2010</u> .   | 6) <input type="checkbox"/> Other: _____                          |

Art Unit: 1791

### **DETAILED ACTION**

1. This is a Final Office Action in response to Applicant's reply, dated 4/26/2010, to a Non-Final Office Action. Claims 1, 5, 7, 10, 13-23, 50, 54, 56, 59, and 62-69 are pending.

#### ***Claim Objections***

2. Claims 50 and 59 are objected to because of the following informalities: Claims 50 and 59 disclose "a clamp for said mold, and thereafter injecting said resin to complete molding, characterized in that...". Both claims are directed to an apparatus and list the various parts of the device; however, the limitation cited above describes a method step of injecting resin. Examiner suggests amending the claim to describe the feature in terms of a physical feature of the mold (i.e., "and the mold cavity is characterized in that...").

3. Claim 59 also recites "each divided area is one in which injects said resin expands over the entire surface", replace "injects said resin" with --injected resin--. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 10 and 59 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter

Art Unit: 1791

which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

6. Claims 10 and 59 recite the die having a groove with depth of 0.5 to 1mm and a gap between the die and intermediate member of 1 to 10mm. However, the originally filed specification recites only discloses a "fine clearance 25 of about 0.5 to about 1mm" between the intermediate member and die (paragraph [0085]) and does not disclose the range for groove depths. Paragraph [0086] recites depths of 5mm and 3mm for the grooves. The 1 to 10mm gap is supported by originally filed claim 12. There does not appear to be support for the claimed groove depth.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 59 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. The claim recites "wherein a gap having a depth of 0.5 to 1mm is formed between said intermediate member and a die facing said intermediate member, and said gap is set in range of 1 to 10mm". It is unclear as to how the gap can satisfy both ranges. For the purpose of examination, the "having a depth of 0.5 to 1mm" is assumed to be referring to the groove as argued in Applicant's arguments (pg 11).

Art Unit: 1791

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 1, 5, 7, 13, 16, 17-19 50, 54, 56, 62, 65 and 66-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekido et al. (JP 2003-025347 of record, with English machine translation) in view of Advani (USP 7,517,481) and Loving (USP 6,203,749).

2. Regarding claims 1 and 50, Sekido et al. (hereinafter Sekido) discloses a RTM molding method and apparatus comprising a mold cavity defined by an upper and lower mold wherein a reinforcing fiber substrate is disposed. Sekido discloses the method involves disposing the fiber substrate within the mold, closing the mold (thus mold is clamped), applying a vacuum to the cavity, and then injecting resin into the cavity (paragraphs [0012-0015], Fig. 3). Sekido does not teach a method or apparatus wherein an intermediate member having grooves for resin paths formed on its surface and

Art Unit: 1791

through holes communicating with said grooves extending to the fiber substrate is employed.

3. In the same field of endeavor of resin transfer molding, Advani discloses that it is often desirable in RTM molding to deliver resin to multiple locations of the mold cavity with specific timing, which can often require multiple gates and vents for flow control purposes (col 1, lines 19-30, col 4, lines 51-58). Advani teaches a mold apparatus wherein an intermediate member (120) is disposed on the surface of one of the molding dies and said intermediate member comprises grooves which extend across the surface and connected to through holes so as to deliver resin to multiple portions of the mold cavity (see Fig. 2-3; col 2, lines 20-39). It would have been obvious to a person having ordinary skill in the art at the time of the invention to use a intermediate member as taught by Advani in the method and apparatus of Sekido for the purpose of providing a mold system which is capable of delivering resin at multiple locations in the mold cavity while avoiding material waste and excessive process time (col 1, lines 32-35).

4. Regarding the injection of resin "from a plurality of positions via said intermediate member almost simultaneously", the apparatus is capable of performing said feature. Additionally, it would be expected that the flow channels in the plate would fill up relatively quickly and thus begin entering the mold cavity from a plurality of positions within a short time interval due to the flow resistance through said grooves being lower than through a fiber reinforced substrate. Thus, such could be considered to be "almost simultaneous".

Art Unit: 1791

5. Regarding the use of a groove for discharging resin, Sekido discloses mold system wherein an outlet is provided for discharging resin and gas. Sekido does not teach a groove which extends substantially over the entire circumference of said reinforcing fiber substrate. In the same field of endeavor of resin transfer molding, Loving teaches that in order to have the vacuum spread evenly throughout the interior of the mold, a vacuum perimeter is provided along the perimeter of the mold top so that the vacuum draws evenly throughout the entire mold (col 5, lines 1-5). This perimeter is illustrated as a groove formed in the molding die's surface (Fig. 1 or 9). Loving further states that the vacuum tube and perimeter can be located on the mold bottom as opposed to the mold top (col 7, lines 52-56, Fig. 9). It would have been obvious to a person having ordinary skill in the art at the time of the invention to dispose a groove around the perimeter of the mold as taught by Loving in the method and apparatus of Sekido and Advani for the purpose of ensuring that the vacuum draws evenly throughout the entire mold.

6. The combination of Sekido, Advani and Loving do not teach nipping and sealing the resin and vacuum members between the intermediate and opposing dies. However, as illustrated by Advani, the resin and vacuum line connections are located at the edge of the plate wherein said plate is then sandwiched between an upper and lower mold platen (see Fig. 1 and Fig. 2A). In order to connect resin and vacuum tubes to such an arrangement, it would have been obvious to a person having ordinary skill in the art at the time of the invention to nip the line connections between the die (at the parting line) and seal the resin and vacuum lines such that resin and pressure leaks could be

Art Unit: 1791

prevented. Furthermore, the specific placement at the parting line is a mere matter of engineering design choice.

7. Regarding claims 5 and 54, Loving states that it would be obvious to locate the perimeter groove at the top, bottom or middle of the mold (col 7, lines 52-56).

Additionally, Advani discloses that the intermediate member can comprise venting channels as well (col 3, lines 1-5).

8. Regarding claims 7 and 56, Advani does not disclose what material the intermediate member is made of. However, metal is a well known material for constructing mold platens (Sekido discloses the metal upper and lower molds, [0019]). It would have obvious to a person having ordinary skill in the art at the time the invention was made to construct the intermediate member from metal since is have been held to be within the ordinary skill of worker in the art to selected a known material on the basis of its suitability for the intended use. One would have been motivated to use metal for the purpose of constructing the mold from a material with high strength and durability. *Sinclair and Carroll Co. v. Interchemical Corp.*, 325 US 327, 65 USPQ 297.

9. Regarding claims 13 and 62, Sekido discloses laminating reinforcing material onto a substrate ([0012]).

10. Regarding claims 16 and 65, wherein gas and excessive resin are discharged intermittently, such would be intrinsic to the mold of Sekido (combined). As resin infiltrates the preform and gas and excess resin are removed from the cavity, gas bubbles will inherently be released along with excess resin via the outlet. It would be



Art Unit: 1791

expected that bubbles mixed with resin would be released during the resin infiltration step and thus result in intermittent release of gas and resin.

11. Regarding claims 17 and 66, wherein the flow rate of resin flowing into the mold is controlled by the pressure differential between the injection pressure of the resin and the pressure within the mold; such would be inherent to any resin transfer process. The flow of resin from one cavity (injection port) to a second cavity (mold) would inherently depend on a pressure drop driving the fluid flow. There would inherently be no net resin flow if the pressures are equal ( $P_m = P_i$ ) and there would be positive flow if the injection pressure is higher than the mold pressure ( $P_i > P_m$ ).

12. Regarding claims 18, 67 and 69, Sekido discloses valves 10 and 14 for controlling the inflow and discharge of resin from the mold (see Fig. 3)—thus controlling port diameters.

13. Regarding claims 19 and 68, the combination does not teach that the timing is stored in memory and that the process is automated. However, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to automate valve opening and closing, since it have been held that broadly providing a mechanical or automatic means to replace a manual activity which accomplishes the same result involves only routine skill in the art. One would have been motivated to automate the valve control of the resin flow rate in order to increase consistency in the filling process and reduce error in the control system. Regarding the timing of the adjustment being stored in memory, such would intrinsically be required for a control system to automatically function.

14. Claim 14, 15, 63, and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekido et al. (JP 2003-025347 of record, with English machine translation) in view of Advani (USP 7,517,481), and Loving (USP 6,203,749) as applied to claim 1 above, and further in view of Waldrop, III et al. (PGPub 2002/0022422).

15. Regarding claims 14 and 63, as discussed above for claims 8 and 57, it would have been obvious to a person having ordinary skill in the art to locate the resin and discharge tubes at the parting line between molding die for the tubes to connect with the intermediate member of Advani. The combination does not expressly teach sealing the portions between tube and die with an elastic material. In the same field of endeavor of resin transfer molding, Waldrop, III et al. (hereinafter Waldrop) disclose a resin transfer device wherein Waldrop teaches that a simplified plumbing system to supply resin and vacuum reduces vacuum leaks and a preferable approach for porting is to deliver resin to the preform with tubes that pass through rubber seals which seal the vacuum pressure within the mold (paragraph 120). Thus, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use rubber seals in conjunction with resin delivery tubes as taught by Waldrop in the mold of Sekido (combined) for the purpose of preventing vacuum and resin leaks.

16. Regarding claims 15 and 64, the Sekido teaches an O-ring 17 for sealing the cavity at the parting surfaces ([0023] and Fig. 3). Regarding the O-ring being incorporated into the elastic material for the seal, Waldrop teaches that tubes are

Art Unit: 1791

preferably passed through the rubber seals of the cavity; thus the tubes would preferably pass through the O-ring seal of Sekido.

17. Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekido et al. (JP 2003-025347 of record, with English machine translation) in view of Advani (USP 7,517,481) and Loving (USP 6,203,749) as applied to claim 1 above, and further in view of Freitas et al. (USP 5,921,754).

18. Regarding claims 20 and 21, Sekido (combined) does not teach the resin flow rate, the projected area and the pressurizing force. In the same field of endeavor of resin transfer molding of composite material, Freitas et al. (hereinafter Freitas) teaches a method for molding turbine rotors wherein resin is injected at 20ml/min-60ml/min and at a pressure of about 30psi (about 0.2MPa). Freitas does not provide the projected area; however, a 20ml/min-60ml/min flow rate would correlate with a projected area range of  $0.033\text{m}^2$  to  $1.2\text{m}^2$  (for claim 20) or 0.01 to 0.6m (for claim 21 using 30psi). One would expect a conventional rotor blade to fall within those areas. It would have been obvious to use the mold conditions of Freitas in the method of Sekido (combined) for the purpose of molding a diverse set of articles objects such as those of similar in size and construction to the rotor blades of Freitas.

19. Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to conduct the molding method according to the claimed flow rate, projected area, and pressure, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable

Art Unit: 1791

ranges involves only routine skill in the art. One would have been motivated to adjust the flow rate and pressure for the purposes of ensuring sufficient resin infusion in a timely manner while preventing damage to the preform. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235.

20. Regarding claim 22, as stated above, Freitas teaches a pressure of 30psi which is about 0.2MPa.

21. Regarding claim 23, the method for molding the articles of Freitas uses a temperature of about 350F for 2hours to cure the articles. While this temperature and time are slightly higher than the claimed ranges, it is well known in the art to select an appropriate temperature and curing time based on the type of resin used as well as the dimensions of the article. It is well within the skill of a person having ordinary skill in the art to select the claimed curing time and temperature based on the type of resin used and size of the article.

### ***Response to Arguments***

22. Applicant's arguments with regards to claims 1 and 50 have been fully considered but they are not persuasive.

23. Applicant argues that the plate of Advani can not vacuum evacuate because of the likelihood of the resin taking a short cut between the injection and resin grooves, thus resulting in resin non-delivered regions. Applicant further argues that if vacuum evacuation is carried out from the groove for gas discharge, it would be reasonable to expect that the deformable sheet would likely close the hole provided in the groove.

Art Unit: 1791

24. Examiner disagrees. Advani states that the mold system can be used in VARTM processes (vacuum assisted resin transfer molding, col 4, lins 54-58). Thus the use of a vacuum is envisioned by Advani and one would not expect the system to be inoperable under vacuum conditions. Additionally, Advani teaches that vents can be controlled to prevent curing fluid from escaping the cavity once the vicinity of the vent gate has been filled (col 4, lines 21-26).

25. Additionally, specifying the location of the injection and discharge members does not necessarily limit the location of the grooves as the claim still recites that the groove for discharge is formed on any of said dies (includes intermediate member). If the location of the discharge groove in relation to the injection groove provides the desired uniform filling effect, then such a limitation should be claimed.

### ***Conclusion***

26. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 1791

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT DYE whose telephone number is (571)270-7059. The examiner can normally be reached on Monday to Friday 8:00AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph S. Del Sole can be reached on (571)272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RCD/

/Joseph S. Del Sole/  
Supervisory Patent Examiner, Art Unit 1791